WE EXPECT THAT THE SAME FEATURES OF CHARM PRODUCTION AT HERA WILL PERSIST FOR BOTTOM PRODUCTION AT THERA

[W.v.Neerven Dec. 2000. thera Webpage

CONCLUSIONS

1. ELECTROPRODUCTION OF HEAVY FLAVOURS IS THE BEST TESTING GROUND OF QCD

THIS PHENOMENON IS DUE TO THE LIGHT CONE DOMINANCE FOR $F_{k,c}$, $F_{k,b}$

2. BECAUSE OF THE NON-RESUMMABLE $\ln \frac{s}{m^2}$ TERMS IN PHOTO AND HADRO PRODUCTION, NNLO CORRECTIONS WILL NOT CLOSE THE GAP BETWEEN PERT QCD AND DATA (TOO LARGE K-FACTORS)

3. STRUCTURE FUNCTIONS AND e^+e^- COLLINEAR SAFE OBSERVABLES ARE THE BEST OBJECTS TO TEST PERT. QCD.

heavy flavour in extended range.

beauty: an embarrasment for QCD

$b\bar{b}$ is suspect . Tung.

$\sigma_{m_{D^0}} \sim 15$ MeV

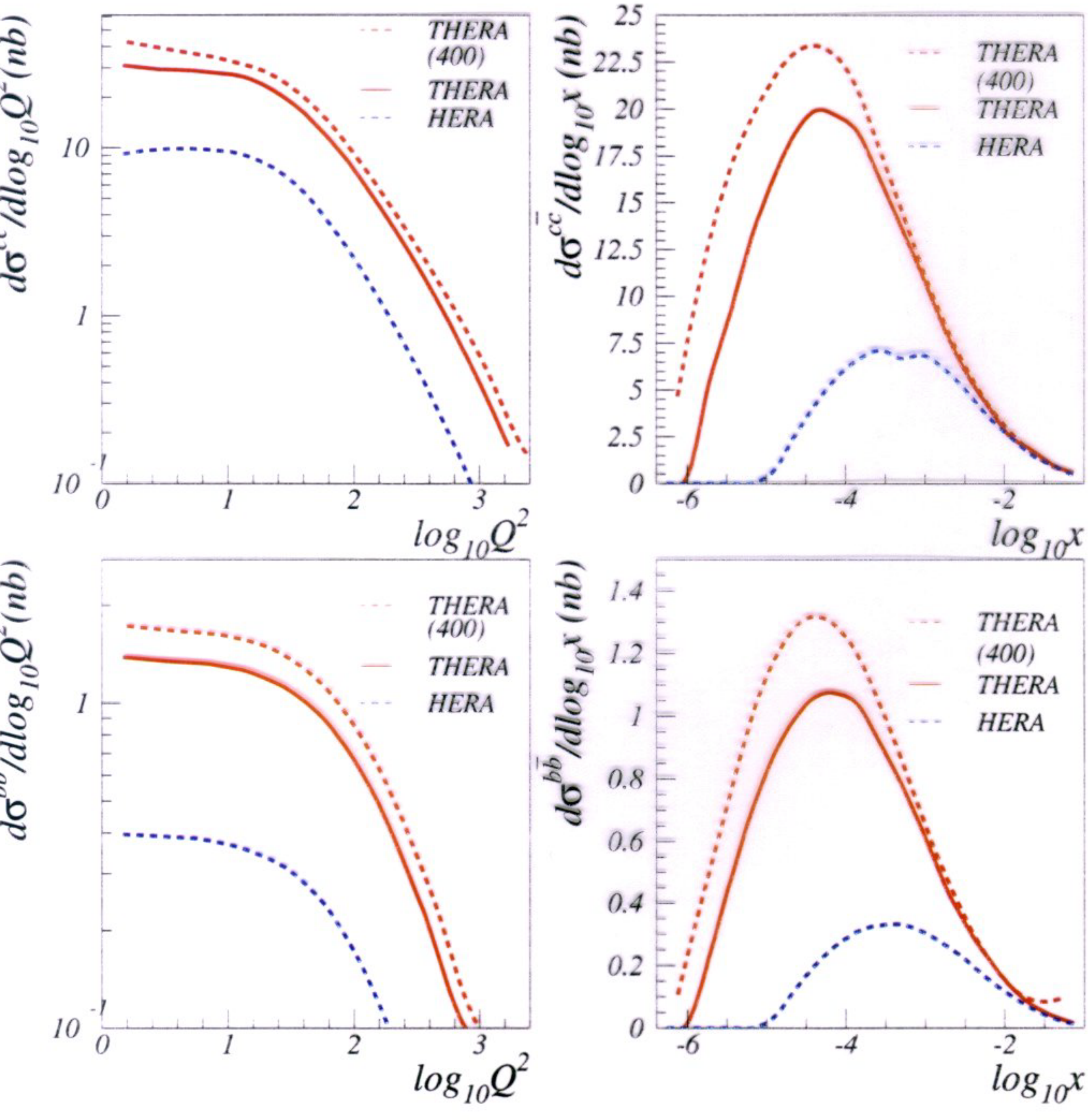
$\sigma_{\Delta M} \sim 0.5$ MeV.

detector simulation.

low x , backwards.

$P_{\pi,K} \sim 4$ GeV

$\vartheta_{\pi,K} \sim 1\text{-}2^\circ$ for D's at $\vartheta < 5^\circ$



charm

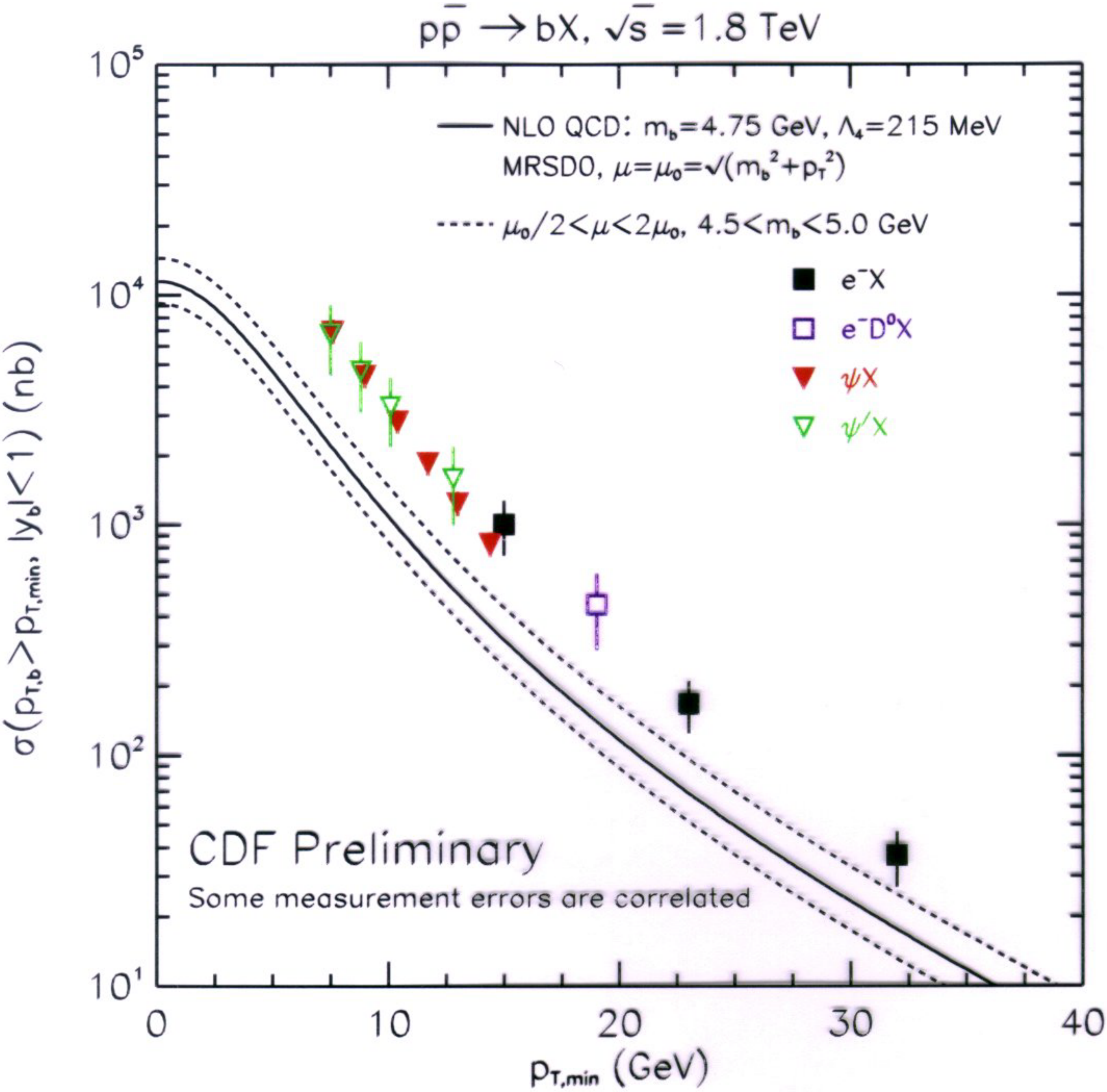
beauty.

" an embarrassment for PQCD

is suspect "

Tung.

Beauty ?



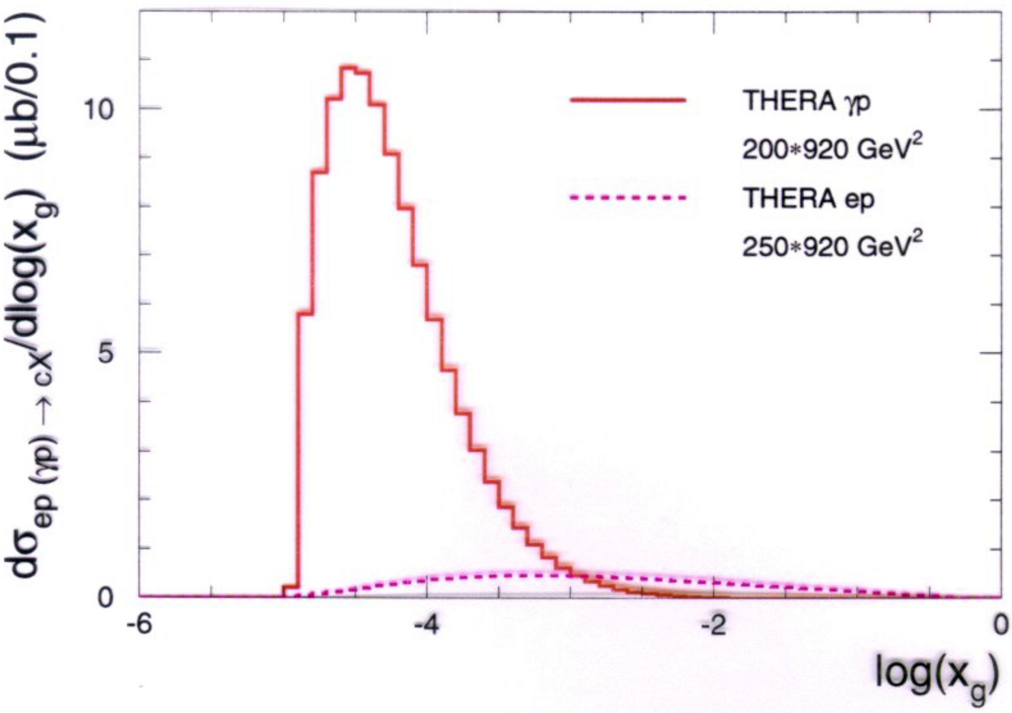
H1. $\sigma_{vis}(ep \to b\bar{b}X \to \mu X) = (170 \pm 25)$ pb

Osaka 00 $\sigma_{NLO\,QCD} = (104 \pm 17)$ pb

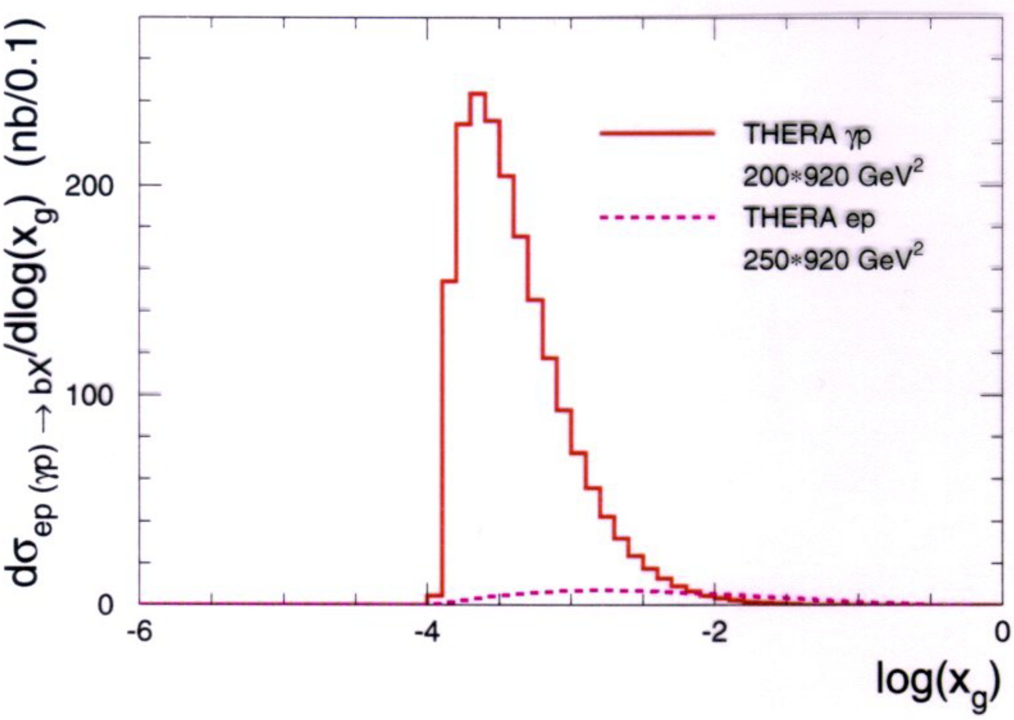
impact parameter analysis using CST.

δ_{rz} 500 μm

real γp ep



dσep (γp) → cX/dlog(xg) (μb/0.1)
THERA γp
200∗920 GeV2
THERA ep
250∗920 GeV2
10
5
0
-6
-4
-2
0
log(xg)

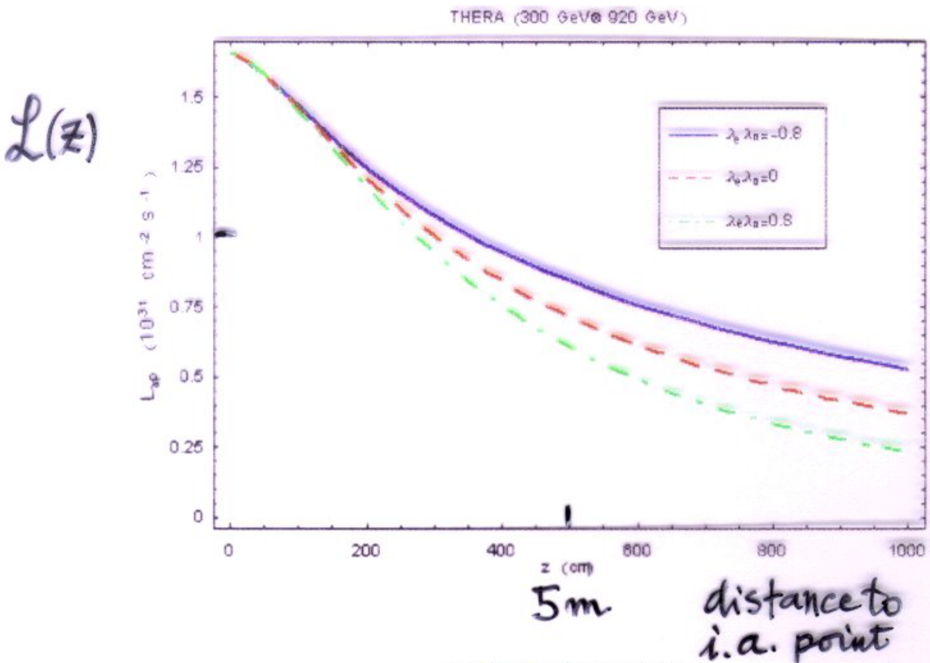


dσep (γp) → bX/dlog(xg) (nb/0.1)
THERA γp
200∗920 GeV2
THERA ep
250∗920 GeV2
200
100
0
-6
-4
-2
0
log(xg)

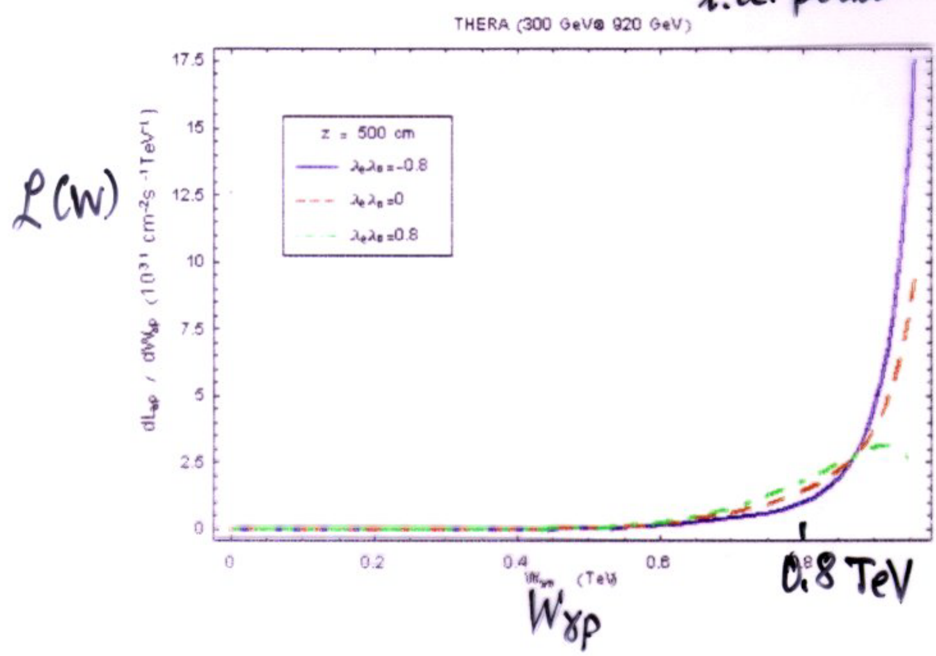
Compton backscattering of laser light off the e beam

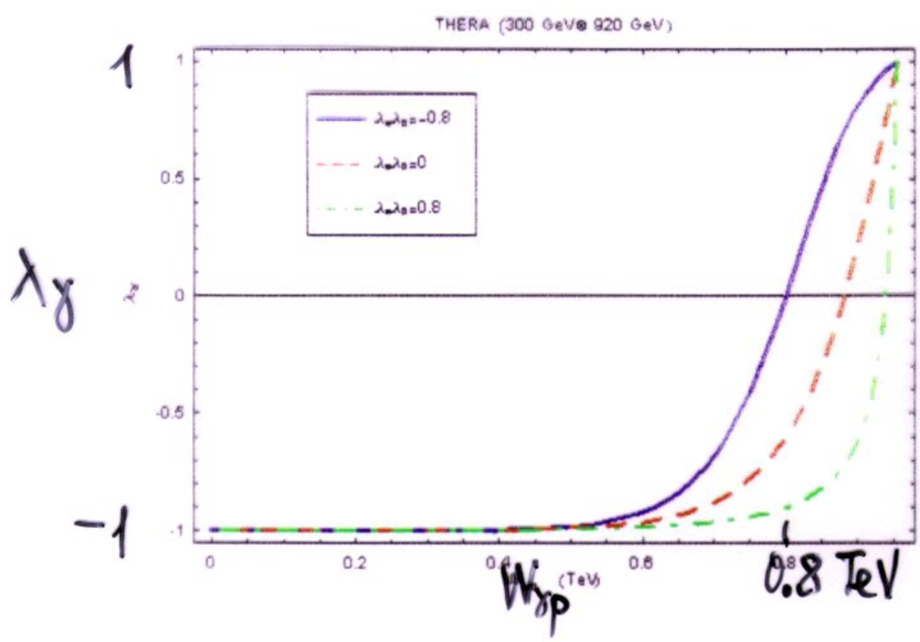
γN @ THERA

$\lambda_e \cdot \lambda_L$ — −0.8, - - 0, —·— +0.8



$\frac{N_\gamma}{N_e} \simeq 0.65$





detector challenge!

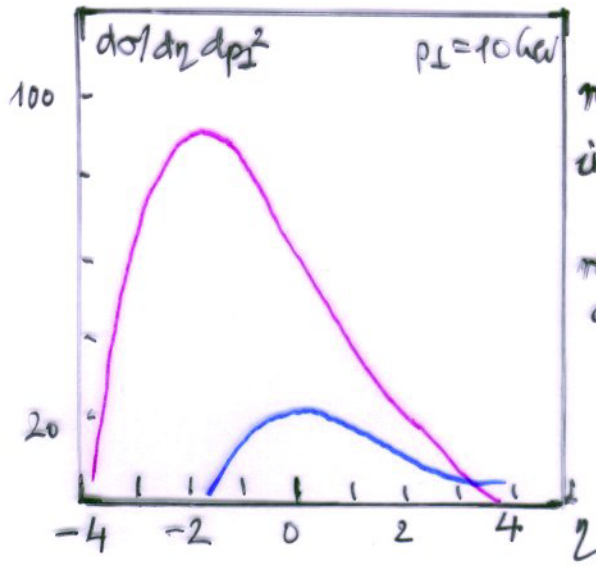
photon structure.

real and virtual.

inclusive dijets, heavy quarks, prompt photons.

LEP - HERA

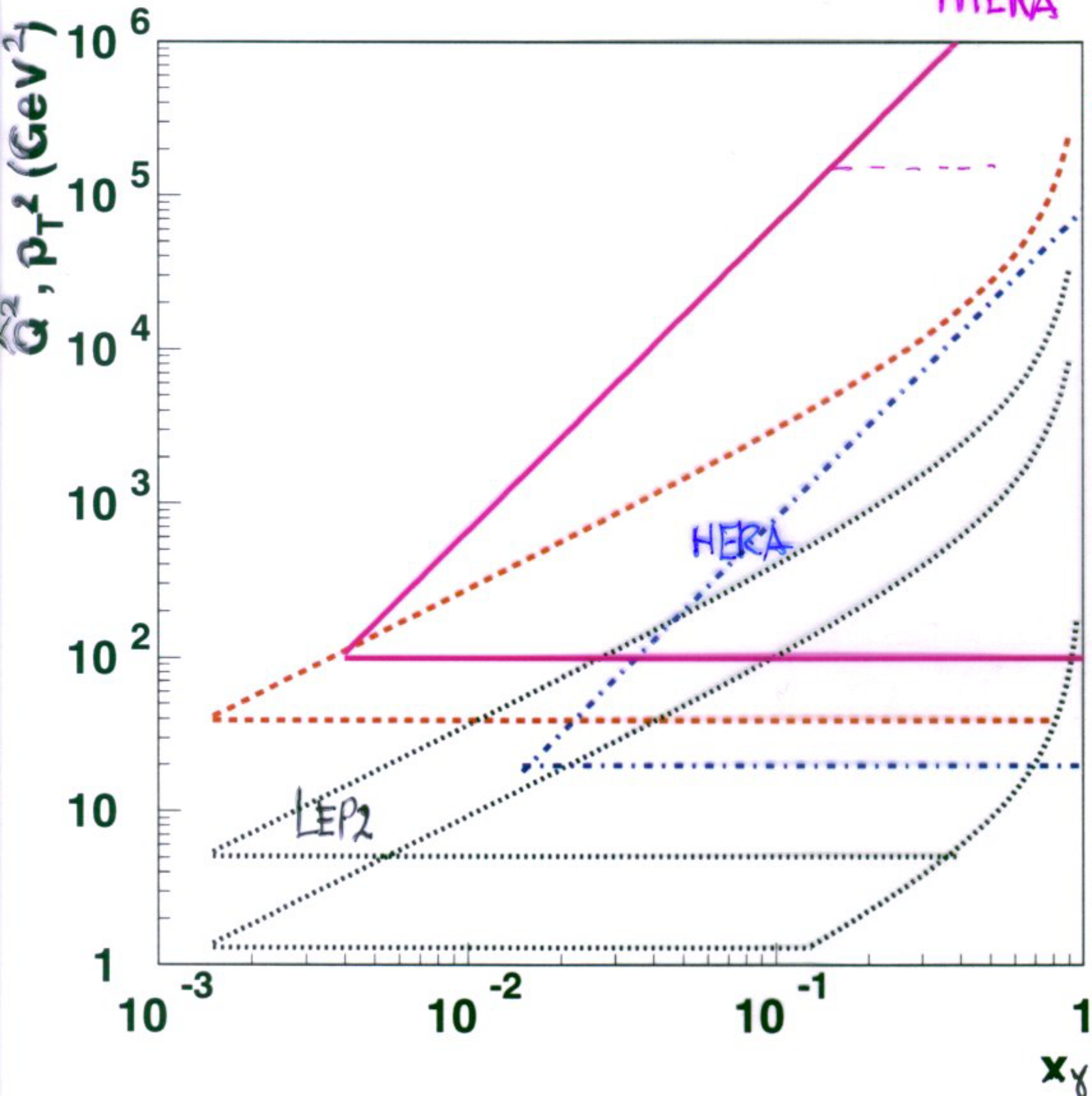
TESLA - THERA.



resolving γ in C production.

resolved/direct ~ 2 at THERA (η.).

THERA $p_\perp$ of hard jets.



TESLA

$\hat{Q}^2$ virtuality of probing photon.

dijet photoproduction.

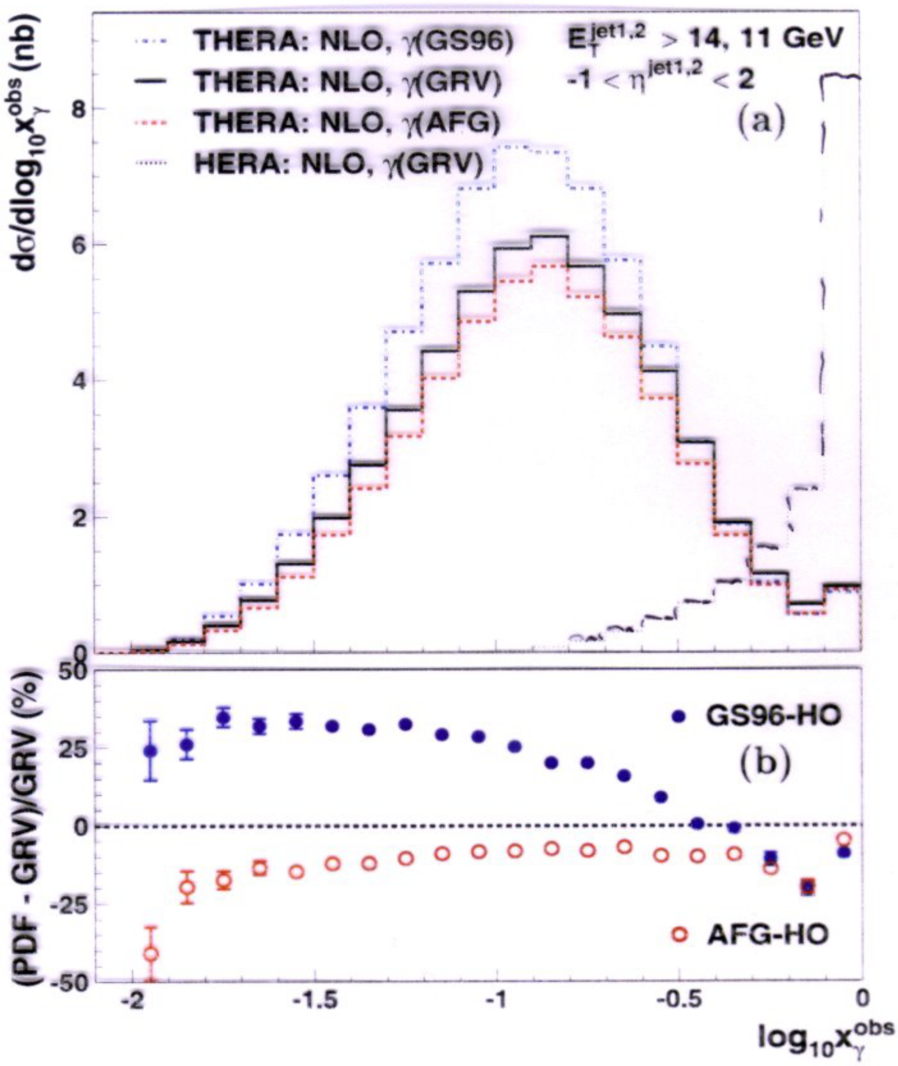
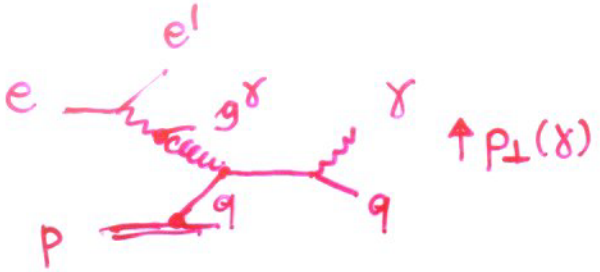


Figure 3: (a) The differential cross section, $d\sigma/d\log_{10}x_\gamma^{obs}$ for inclusive dijet photoproduction at HERA and THERA as predicted by a NLO calculation. For the kinematic range, $Q^2 < 1$ GeV^2, $0.2 < y < 0.85$ the prediction for HERA is shown as the dotted line. For THERA with the same kinematic cuts, three photon structure functions are shown; GS96-HO (dot-dashed line), GRV-HO (solid line) and AFG-HO (dashed line). In (b) the percentage differences in the cross-sections between the three predictions for THERA are shown as a function of $\log_{10}x_\gamma^{obs}$. The relative difference of the predictions using GS96-HO (solid points) and AFG-HO (open points) with respect to GRV-HO is displayed.

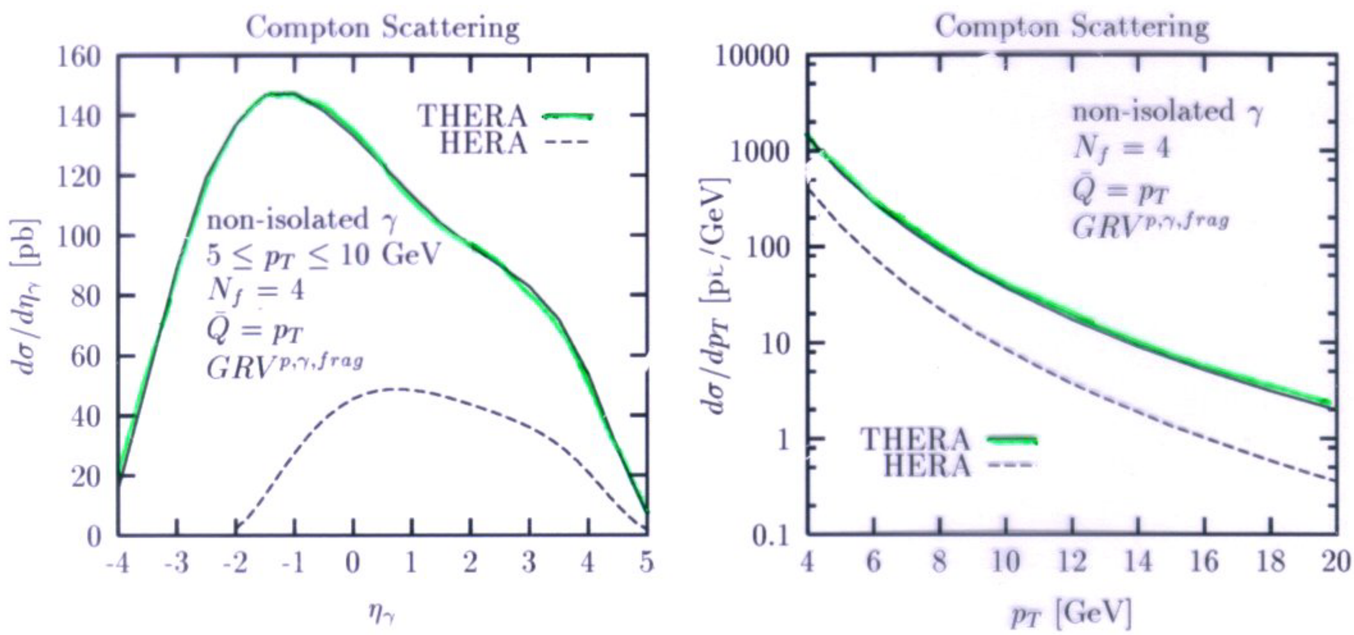


M. Krawczyk
A. Zembrzuski
(hep-ph/9810253
and IFT 99/14)

e.g. Prompt photons at THERA

NLO calculation

$$ep \to e\gamma X$$
photoproduction $Q^2 \approx 0$



$$0 < y = E_\gamma/E_e < 1$$
$$Q^2 \leq 1 \text{ GeV}^2$$

- for $\eta_\gamma > 0$ (frwd) $g^\gamma \cdot q$ dominates, ratio to Born ($p^2 = Q^2$). for THERA much higher than for HERA (~5‥10 times)

⇨ study gluon structure of the photon.